The Prevalence and Determinants of Stateless Income

A thesis submitted in fulfilment of the requirements for the degree of Master of Business (Economics, Finance & Marketing)

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Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis/project is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

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Abstract

This research investigates stateless income tax strategies pursued by firms that are publicly listed in the United States. Stateless income strategies are employed by multinational corporations, particularly American firms, through a Double Irish Dutch Sandwich (DIDS) structure to reduce tax liabilities. By examining 700 listed U.S. firms over the period from 2004 to 2013, this research found that larger firms with higher levels of foreign income are more likely to adopt a DIDS structure. Additionally, multinational corporations employing a DIDS structure are associated with a lower effective tax rate compared to their domestic counterparties. Regression analysis demonstrates that a firm's effective tax rates are associated with its size, leverage, capital structure, capital mix and foreign income. We propose that development and investment in intellectual property is an important component in generating stateless income, and firms engaged in stateless income strategies hold large amounts of cash outside of the U.S.

Introduction

Corporate taxation revenue is one of the most important sources of income for the government. However, multinational corporations avoid tax liability by operating in different countries and jurisdictions, using approaches such as stripping earnings and shifting profits from high tax rate countries to low tax rate countries (OECD 2013). Tax avoidance is not a new issue in global business (Shackelford and Shevlin 2001; Desai and Dharmapala 2006). Hamilton et al. (2001) contend that multinational corporations have arrangements for tax avoidance included in their overall commercial arrangements. Kleinbard (2011) describes tax free income arising from the sophisticated tax planning structure embedded in multinational business activities as stateless income. Previous studies show large multinational corporations take advantage of gaps in taxation rules between countries to reduce their tax liabilities (Braithwaite 2005). OECD (2013) warns that the overall effect of a stateless income strategy is to erode the corporate tax base of many countries.

The research investigated how multinational corporations avoid corporate taxation through stateless income strategies; it inspected whether stateless income strategies are only accessible by companies that have been the focus of the media or if it is widely applicable to all large multinational corporations; and examined anecdotal claims that stateless income strategies are popular with large American firms. The data sample included the top 700 U.S. listed companies in terms of market value from 2004 to 2013. This broad period provided more rigorous empirical evidence on the prevalence of stateless income, and the relationship between stateless income strategies and the characteristics of the firm than single company case studies (Drucker 2010; Kocieniewski 2011). The research involved exploring whether multinational corporations are paying a lower tax rate than domestic companies, whether the lower effective tax rate is due to stateless income, and the characteristics of these firms. Specifically, it examined the relationship between the level of effective corporate tax rates and a firm's size, capital structure, capital mix, performance and other

characteristics.

Empirical findings suggest that firms with a higher proportion of intellectual properties are more likely to adopt a Double Irish Dutch Sandwich (DIDS) structure, though the interaction of intellectual properties and a DIDS structure are different across industries. The empirical results also show that firms adopting a DIDS structure tend to have lower effective tax rates (ETRs) compared to firms that do not engage in a DIDS structure. Additionally, the adoption of a DIDS structure has a significant impact on a firms' operating strategies. For example, firms with a DIDS structure tend to hold a large amount of cash outside U.S. territory and pay less dividends.

The research contributes to current knowledge in several aspects. Firstly, it provides a comprehensive review and analysis on the prevalence and determinants of stateless income strategies. Secondly, it is the first study that extends the current body of knowledge relating to ETRs by empirically exploring the relationship between stateless income strategies and firm effective tax rate. Most notably, a new variable is developed that enables an analysis of the impact of stateless income strategies on a firm's effective tax rate. Further contributions to the literature on stateless income include an exploration of the interaction between development and investment in intellectual property and cash balances on stateless income strategies and DIDS structures, and the effect on ETRs.

This thesis is organized as follows: Section 1 contains background discussion on stateless income. Section 2 reviews the literature and develops hypotheses. Section 3 describes the research design and methodology. Section 4 describes data and empirical findings. Finally, a summary and conclusions are presented in section 5.

1. Stateless income

1.1 What is stateless income?

Stateless income is described as income derived by a multinational group from business activities in a country other than the domicile of the group's ultimate parent company. It is subject to tax only in a jurisdiction that is not the location of the customers or the factors of production through which the income was derived, and is not the domicile of the group's parent company (Kleinbard 2011).

1.2 The practice of stateless income

Multinational corporations generate stateless income through their aggressive approach to tax planning. The ultimate goal of aggressive tax planning is to minimise the overall expense of taxation to the group (Gresik 2001). Traditionally, for a domestic company facing a fixed statutory corporate tax rate, higher profit will always lead to a higher corporate tax expense. Firms need to deliberately reduce taxable income to reduce taxation expense. The multinational status of a firm provides managers with the opportunity to reduce the overall tax expense as corporate taxation rates vary across countries. There are various ways multinational corporations can generate stateless income. Four popular tax planning strategies are summarized in the following sections.

1.2.1 Profit Shifting

Profit shifting involves a corporation shifting profits generated in a high tax region to a low tax region for the purposes of reducing overall income tax. Profit shifting could be generated through an intragroup debt financing structure whereby the multinational company will create a debt financing arrangement between two arms of the business group where one arm is a tax resident in a high tax region, and the other is a tax resident in a relatively lower tax region. Thus, tax-deductible expenses can be acquired by the subsidiary in the high tax nation and reduce overall tax liability. However, this is

not consistent with the notion that members of a multinational corporation operate as independent entities rather than inseparable parts of a single unified business. Multinational corporations unify their decisions across countries to act in the best interest of the whole group rather than individual entities. Several studies document that internal debt activities have significant effects on the taxation liability of multinational firms (Grubert and Mutti 1991; Huizinga and Laeven 2008; Buettner and Wamser 2013). In short, this profit shifting mechanism would not change the overall income of multinational corporations as a group, but it can effectively lower the total income tax expense paid to tax authorities.

1.2.2 Cost-Sharing Arrangements

A cost-sharing arrangement is defined as "an arrangement under which controlled participants agree to share the costs and risk of developing intangible property in accordance with their reasonably anticipated shares of benefits from the intangibles" (Code of Federal Regulations 2014). This strategy is widely adopted by multinational corporations to split the usage rights and development costs of their intangible property across different tax regions. A common approach is to allocate usage rights to low tax regions, and development costs to high tax regions. Multinational corporations rely on intangible property to enable cost-sharing arrangements and reduce tax liabilities. Intangible property becomes a legal mechanism for multinational corporations to shift profits to low tax countries. Ting (2014) argues that the cost-sharing arrangements used by multinational corporations, such as Apple, cannot be legitimately justified because they shift a disproportionate amount of profit to subsidiaries in low tax regions.

1.2.3 Transfer Pricing

Another strategy to generate stateless income is transfer pricing (Altshuler and Grubert 2003). Multinational corporations adopt aggressive intragroup transactions

that favour subsidiaries in low tax countries and hence shift profit from high tax countries to low tax countries, eventually reducing the total tax expenses of the consolidated business group. However, intragroup transactions need to follow the arm's length principle required by tax authorities, which posits that the price charged by related parties should be similar to the price based on independent market transactions (OECD 2010). Kleinbard (2011) states that the arm's length principle does not work well when a multinational corporation licenses high-value internally created intangibles that have no direct measurable market value to its subsidiaries. This argument is supported by a case study on Starbucks U.K., a multinational company that pays a substantial royalty fee (or franchise fee) to its Netherlands subsidiary, which results in an overall income loss being reported to the U.K. taxation authorities (Kleinbard 2013). The use of intragroup transactions between subsidiaries has a significant impact on the taxable income reported to local taxation authorities and the tax paid. Hence, a transfer pricing strategy allows multinational corporations to lower the total corporate tax rate for the consolidated business group.

1.2.4 The Geographical Location of Subsidiaries

The fourth strategy to generate stateless income is through regulatory arbitrage, which involves multinational corporations exploiting differences in taxation laws between countries. For example, a tax-deductible item in one country might not receive similar tax treatment in other jurisdictions. Corporations can effectively generate income that is not taxed by any of the tax authorities due to inconsistencies between the different legal systems. This approach requires expanding the business in low tax regions. A nation's corporate tax rate is one of the most important factors for multinational corporations when they make decisions about investments. Multinational corporations can allocate their highly profitable projects from high tax regions to low tax regions by expanding business across different jurisdictions with different tax rates and legal definitions, which allows them to minimise tax and maximize profits. Multinational corporations can have a lower effective tax rate compared to their

domestic counterparts by engaging in discretionary corporate expansion and generating stateless income.

1.3 The Double Irish Dutch Sandwich

The DIDS has become one of the most popular tax planning strategies for multinational corporations incorporated in the U.S. Typical tax planning strategies related to the DIDS include profit shifting, transfer pricing, cost-sharing arrangements and exploiting conflicting tax codes.

Figure 1 describes a typical DIDS structure. First, a multinational corporation establishes an Irish subsidiary ('Irish Holdings'). The parent company sells the right to use an intangible asset outside the home country for a fraction of the development cost. The parent company still has the rights to use the intangible asset in the U.S., but Irish Holdings takes over the rights to use it in business outside the U.S. As a result, the distribution of tax deductibility does not match the distribution of the profit. Therefore, multinational corporations deliberately allocate more before-tax profit into low corporate tax regions.

Second, Irish Holdings establishes a subsidiary in Bermuda for tax purposes, and claims the Bermuda subsidiary as the 'effective centre of management' for the Irish Holdings Group. Consequently, Irish Holdings then becomes a dual resident company, whereby it incorporates in Ireland while simultaneously being a tax resident of Bermuda. Therefore, for U.S. taxation purposes, Irish Holdings is an Irish corporation and tax resident. For Irish taxation purpose, Irish Holdings is a tax resident of Bermuda. At the same time, Irish Holdings establishes a subsidiary in Netherlands ('Netherlands Holdings'). Netherlands Holdings has the rights to use the intangible asset controlled by the Irish Holdings. Third, Netherlands Holdings again establishes another subsidiary in Ireland ('Irish Limited'), and sub-licenses Irish Limited to use the intangible asset, operate business and collect revenues from customers outside the U.S.

Eventually, fees paid to Irish Limited in the source countries are tax deductible. Irish withholding tax is applied if a royalty fee is paid directly from an Irish company to its Bermuda subsidiary. However, Irish withholding tax can be waived if the royalty fee is paid to the Netherlands subsidiary as both are company residents in the EU. Therefore, Irish Limited transfers its income to the Netherland subsidiary as a royalty fee, and then the Netherlands subsidiary transfers funds as a royalty fee again to the Bermuda subsidiary (the reason being that Netherlands does not apply withholding tax on royalty fees paid to another company outside the EU). As a result, Irish Limited does not have to pay any Irish corporate tax as it has been fully deducted. As the Netherlands subsidiary pays its profits to the Bermuda subsidiary of the Irish Holdings through a 'royalty fee', it does not retain any profit and hence avoids taxation liability on this amount to Dutch authorities. As the corporate tax rate in Bermuda is zero, all income moved to Irish Holdings avoids corporate tax.

The Netherlands subsidiary and Irish Limited are not considered as legal entities for U.S. taxation purposes by virtue of electing to use 'check the box' filings. Hence, no direct U.S. taxation law can be applied to these two subsidiaries. However, under Irish taxation law, Irish Holdings is also considered a Bermuda company; therefore, no tax is applied. Moreover, firms involved in stateless income strategies would face an earnings lock-out effect (Kleinbard, 2011). This means that the firm must retain most of its earnings overseas (outside the U.S.) because U.S. corporate taxes will be applied if the directors decide to send the foreign income back to the U.S. Hence, a popular choice for multinational corporations is to retain a large amount of profits in low tax countries, which are kept in relatively low-yielding liquid investments or reinvested in foreign subsidiaries instead of sent back to the U.S. firm.

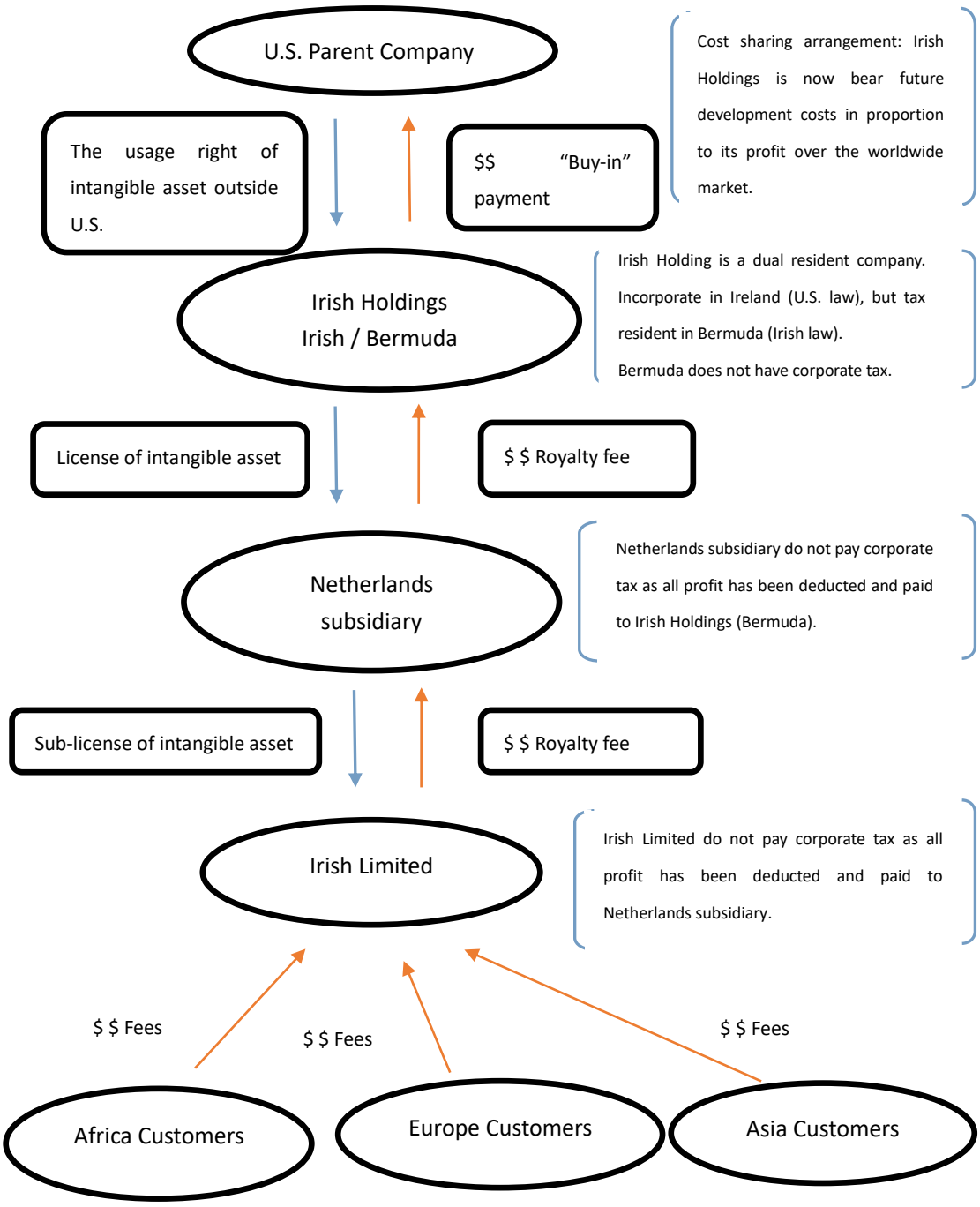

Figure 1 ***Double Irish Dutch Sandwich Structure***

2. Literature review and development of hypotheses

Tax planning strategies employed by multinational corporations are well documented in the literature (Slemrod 2001; Creedy and Gemmell 2011; Taylor and Richardson, 2012). Common tax planning strategies include profit shifting, cost-sharing and transfer pricing to gain tax benefits for the entire business group (Rego 2003; Dyreng and Lindsey 2009; Faulkender and Petersen 2012). Furthermore, sophisticated and aggressive tax planning strategies have been employed by multinational corporations to generate tax free income, which is normally called stateless income (Kleinbard 2011). Multinational corporations use such strategies to effectively manage their taxable income and expenses across all subsidiaries located in various places, and reduce the tax liabilities for the whole consolidated business groups.

As stateless income tax strategies and a DIDS structure are purely lawful in the jurisdictions involved, they could be considered as a special investment project for minimising tax liabilities. The theoretical relationship between investment and taxes has been well documented in the literature. For example, the neoclassical theory of investment proposed by Hall and Jorgenson (1967) argues that the cost of investment is a function of the required return on investment with an adjustment of corporate taxes. This argument has been further supported by the work of Hasset and Hubbard (2002) who review the Hall and Jorgenson (1967) model as the effect of tax planning strategy on investment. Recently, Anderson (2012) uses this model to examine the relationship between taxes and the user cost of capital, and finds that a higher corporate tax rate has the effect of increasing the after-tax rate of return for investors and, thus, increases the user cost of capital.

Recently Tobin's q has become a popular approach to empirically investigate the practical application of the neoclassical theory of investment (McNichols and Steubben 2008; Bushman et al. 2008; Biddle et al. 2009). Additionally, Tobin's q is a better measure in terms of reflecting the market sentiment (Richard et al. 2009). The

rational investor would choose to adopt the project as long as the marginal revenue exceeds the marginal cost or the *q* value exceeds 1 (Bolton et al., 2011). Thus, as long as the cost of developing and establishing a DIDS structure is less than the amount of tax that could be saved, multinational firms would choose to adopt it as a major tax planning strategy.

Empirical studies focusing on the relationship between investment decisions and tax liabilities have found that investment in intangible assets has a significant negative impact on the tax rate because expenditure relating to research and development is tax deductible, therefore, leading to a lower tax rate (Gupta et al. 2006; Chen and Gupta 2009). Additionally, the destination of the investment also considerably influences a firm's decision. Maydew (2001) argues that firms attempt to invest in countries with lower tax rates. Additionally, Shackelford et al. (2010) finds that U.S. firms are more likely to invest overseas due to the special tax treatment which allows them to retain their foreign profits until these profits are repatriated to the U.S. However, empirical evidence that addresses the causes and consequences of 'stateless income' tax strategies is limited.

Numerous attempts have been made to explain ETRs and demonstrate their empirical relationship to the characteristics of firms. Popular choices for the independent variables are the size of the firm, leverage, and inventory level, level of intangible assets, profitability, and industry. However, empirical findings are mixed. They show that ETRs are associated with size of the firm (Porcano 1986; Tran 1997; Grubert and Mutti 2007; Dyreng et al. 2008), capital structure (Gupta and Newberry, 1997), and intangible assets (Huizinga et al., 2008). However, very few studies investigate how ETRs are related to large multinational firms (Taylor and Richardson, 2012; and Markle and Shackelford, 2012). In addition, investigation into the effect of 'stateless income' tax strategies on firms' ETRs is lacking in the current literature. As discussed before, 'stateless income' tax strategies are an advanced tax planning structure used to aggressively reduce a firm's tax liabilities. The following section provides a detailed

discussion on the existing literature and develops hypotheses.

2.1 DIDS – The geographic location of subsidiaries, foreign income and repatriation

A firm engaging in stateless income tax strategies must necessarily have a subsidiary operating in a tax jurisdiction that offers a lower corporate tax rate than that of the U.S. By operating across countries and jurisdictions with different tax rates, multinational corporations can shift income within the group to lower tax rate regimes and minimise their overall tax liabilities (Maydew 2001; Beuselinck et al. 2005). Kleinbard (2011) argues that stateless income is a more aggressive tax planning strategies employed by multinational corporations. It could be generated through a DIDS structure, in which, established subsidiaries located in Ireland and the Netherlands is a necessary requirement to generate 'stateless income'. Firms having Irish and Dutch subsidiaries would be more likely to adopt a DIDS structure and generate stateless income, leading to lower ETRs.

Taylor and Richardson (2012) find a significant negative relationship between the ETRs and the international operations of a firm. Establishing a foreign subsidiary is a key component of tax planning strategy, as multinational corporations can use intragroup transactions to increase profit in low tax countries and hence reduce total tax expenses. However, a firm's ability to reduce tax liabilities is also affected by the proportion of foreign income generated. The more foreign revenue reported in the low tax rate countries, the lower the ETRs. Empirical evidence shows that firms with a larger portion of foreign income enjoy lower ETRs and have more opportunities to engage in tax avoidance activities compared to their domestic competitors (Rego 2003; Dyreng et al. 2008; Richardson and Lanis 2007). This situation can be attributed to U.S. tax regulations; a worldwide tax system that requires corporations to report on all foreign income. However, foreign revenue is not subject to US income tax if it has not been repatriated back to the parent companies in the U.S. because ABP23 (Accounting for

Income Taxes – Special Areas) allows for an exception where a corporation need not record deferred tax liabilities if the foreign revenue is permanently reinvested in the foreign jurisdiction until it decides to repatriate the revenue. In this case, the income tax expense on this foreign revenue would be only at the tax rate of the local jurisdiction instead of the U.S. statutory tax rate.

The repatriation decision is aligned with the lock-out effect, which involves multinational corporations that report massive foreign income from low tax jurisdictions retaining these profits outside the U.S. and experiencing difficulty sending them back to parent companies. Foley et al. (2007) presents evidence that large cash balances are related to repatriation taxes. Following from the above discussion, it is hypothesized that:

H1: There is a negative relationship between ETRs and DIDS.

H2: There is a negative relationship between ETRs and firm foreign income.

H3: There is a negative relationship between ETRs and cash and cash equivalent.

2.2 Size of a firm

Many studies have focused on the effect of a firm's size on corporate ETRs. Zimmerman (1983) finds a positive relationship between corporate size and ETRs and uses a "political cost hypothesis" to explain this phenomenon. This hypothesis suggests that large and high profitability firms attract more media and consumer attention, which can result in tougher regulatory scrutiny and minimise opportunities for tax avoidance (Watts and Zimmerman, 1978). Rego (2003) also finds a significant positive relationship between ETRs and size using logarithm net sales as an alternative indicator of size. In contrast, Porcano (1986) finds that the firm's size and its ETRs are negatively related, which could also be explained by a political power hypothesis that that larger firms have more power to influence the setting of regulations in their favour. The study of Australian listed firms by Tran (1997) finds that larger firms have lower ETRs than smaller firms.

Gupta and Newberry (1997) used two samples of firms to analyse the relationship between their size and ETRs, and generated contradictory results. Therefore, they argue that effect of a firm's size is subject to the samples selected. Moreover, Jacob (1996) and Mills (1998) find an insignificant relationship between ETRs and a firm's size. Combining the political power and political cost hypothesis, Davidson and Heaney (2012) observe a non-linear relationship between a firm's size and its ETRs, arguing that both hypotheses can be better explained by a quadratic relationship. Although the empirical evidence is mixed, recent studies are more likely to observe a negative relationship between the size of a firm and ETRs (Richardson and Lanis 2007; Markle and Shackelford 2012; Taylor and Richardson 2012), which likely reflects the recent phenomenon of adopting a DIDS strategy. Following from the above discussion, it is hypothesized that:

H4: There is a negative relationship between ETRs and firm size.

2.3 Capital structure & capital-intensive

Capital structure is another important factor affecting a firm's ETRs. Modigliani and Miller (1963) discover that tax-deductible interest creates incentives for firms to use debt financing. Hanlon and Heitzman (2010) suggest that the relationship between the capital structure of a firm and ETRs could be explained by the substitution hypothesis, which suggests that firms are less leveraged if they are associated with more non-debt tax shields. As debt financing generates a tax-deductible interest expense, firms that rely more on equity financing do not get such tax credit for dividend payouts. This hypothesis is supported by Stickney and McGee (1982), who found that firms bearing higher leverage tend to have lower ETRs. Several other studies reach similar conclusions (Gupta and Newberry 1997; Rego 2003; Richardson and Lanis 2007). Debt financing decisions may also be influenced by the extent of a firm's globalization and its ability to generate stateless income. As discussed, multinational firms use an intragroup debt financing structure to shift profits from high to low tax rate regimes to

reduce their corporate taxes (Huizinga and Laeven 2008; Buettner and Wamser 2013). Therefore, multinational firms bearing higher leverage have a higher potential and ability to generate such advantage.

Gupta and Newberry (1997) and Stickney and McGee (1982) also point out that firms with a high proportion of fixed assets tend to have lower ETRs than firms holding large amounts of inventory. The reason is that there are tax incentives on holding fixed assets as taxation laws often allow for the application of different depreciation methods to fixed assets as compared to inventory. For example, firms can write off the value of depreciable assets in a shorter period than their actual economic lives and thereby receive favourable tax treatment (Richardson and Lanis 2007). Therefore, capital-intensive firms would face lower ETRs. This argument is supported by Zimmerman (1983) as he found that firms in the manufacturing sector are associated with lower ETRs relative to firms in wholesale and retail sectors, and that ETRs do vary between industries due to the characteristics of capital intensity. However, these studies do not identify the effect of tangible and intangible assets on a firm's effective tax rate.

More recent studies investigate the relationship between ETRs and investment in intangible assets (Hassett and Newmark 2008). Huizinga et al. (2008) and Grubert and Mutti (2007) suggest that firms with a large proportion of intangible assets are associated with lower ETRs. Concrete instances are well documented in the media; tech companies are criticized for avoiding taxes by relying heavily on their intellectual property to generate service and sales (Drucker 2010; Kocieniewski 2011). Another factor related to the development and investment of intangible assets is a firm's research and development expenditure (Berger, 1993). As firms engage in research and development to build and develop their intellectual intangible property, expenditure in research and development is negatively related to ETRs (Gupta and Newberry, 1997; Gupta et al., 2006; Chen and Gupta, 2009). Therefore, it is hypothesized that:

H5: There is a negative relationship between ETRs and firm leverage.

H6: There is a negative relationship between ETRs and firm capital intensity.

H7: There is a positive relationship between ETRs and firm inventory intensity.

H8: There is a negative relationship between ETRs and firm R&D intensity.

2.4 Performance of a firm

To examine the determinants of corporate tax rate, previous studies also consider the effect of firm specific variables on ETRs. For instance, the relationship between ETRs and firm performance has been considered in several studies (Gupta and Newberry, 1997; Derashid and Zhang, 2003; Richardson and Lanis, 2007). Empirical findings show that firm performance is positively related to ETRs, supporting the notion that higher profit lead to a higher corporate tax expense. It is therefore hypothesized that:

H9: There is a positive relationship between ETRs and a firm's performance.

2.5 Dividend decisions

Firms engaging in stateless income strategies are reluctant to send profits back to U.S. due to tax concerns. Although a significant amount of profit is recognized in their consolidated statements, multinational corporations may have to retain and reinvest those profits in their foreign subsidiaries. Therefore, firms engaging in a stateless income strategy might not be able to pay good dividends to shareholders of parent companies even when they have a large amount of profit retained in foreign subsidiaries. Thus, stateless income practices may have an impact on a firm's ability to raise the cash for a dividend payout to shareholders of parent companies. Following from this, it is hypothesized that:

H10: There is a negative relationship between firm dividend yield and DIDS.

3. Methodology

3.1 Sample and data

The data for this study was sourced from the Bureau van Dijk Orbis database. The initial sample included the top 700 listed companies in the U.S. in terms of market capitalization because stateless income tax strategies can only be exploited by large multinational corporations due to their global operations (Kleinbard, 2011). The sample spans from 2004 to 2013, a period which represents the most relevant and recent years that were available on the database. The final sample set was constructed by excluding firms with missing data on the explanatory variables (the firm contains 'n.a.' in any of the observations); and those with outlier ETRs (that is, firms with ETRs either less than 0 or greater than 0.45). Literature shows that an analysis of ETRs would be distorted if a firm reports negative incomes and abnormal ETRs greater than the statutory corporate tax rate (Gupta and Newberry 1997; Rego 2003; Richardson and Lanis 2007). The reason is that unusual tax related events can cause model estimation problems (Richardson and Lanis 2007; Markel and Shackelford 2012). The final data set consisted of 392 firms and 2837 firm-year observations.

The Orbis database does not report when the foreign subsidiary was established. Therefore, we followed the approach of Markle and Shackelford (2012) who found that the estimated coefficient of subsidiary measure for each year is similar regardless of the sample period. Another potential limitation of using Orbis is that firms may report total North America revenue as a whole in the geographic segment. As a result, we treated the total North America revenue as the total revenue from the U.S with the assumption that the difference between U.S. and North American revenue is insignificant.

Table 1 Summary Descriptive Statics for Different Years and Industries

Panel A: Summary for year and industry

	Non-DIDS	DIDS	Total	Percentage
y2004	108	71	179	6.3%
y2005	152	106	258	9.1%
y2006	165	109	274	9.7%
y2007	188	120	308	10.9%
y2008	186	109	295	10.4%
y2009	183	107	290	10.2%
y2010	177	117	294	10.4%
y2011	198	123	321	11.3%
y2012	185	113	298	10.5%
y2013	203	117	320	11.3%
Total	1745	1092	2837	100.0%

Panel B: Summary of industry

	Non-DIDS	DIDS	Total	Percentage
indA	18	0	18	0.6%
indB	41	13	54	1.9%
indC	829	769	1,598	56.3%
indD	308	0	308	10.9%
indE	0	3	3	0.1%
indF	33	0	33	1.2%
indG	294	123	417	14.7%
indH	53	0	53	1.9%
indI	51	24	75	2.6%
indJ	41	114	155	5.5%
indK	9	0	9	0.3%
indM	13	42	55	1.9%
indN	10	4	14	0.5%
indQ	36	0	36	1.3%
indS	9	0	9	0.3%
Total	1745	1092	2837	100%

Industry code are follow NACE. industry code where Industry A: Agriculture, forestry and fishing; Industry B: Mining and quarrying; Industry C: Manufacturing; Industry D: Electricity, gas, steam and air conditioning supply; Industry E: Water supply; sewerage, waste management and remediation activities; Industry F: Construction; Industry G: Wholesale and retail trade; repair of motor vehicles and motorcycles; Industry H: Transportation and storage; Industry I: Accommodation and food service activities; Industry J: Information and communication; Industry K: Financial and insurance activities; Industry M: Professional, scientific and technical activities; Industry N: Administrative and support service activities; Industry Q: Human health and social work activities; Industry S: Other service activities

Table 1: Summary Statistics on the relationships between DIDS structure, industry and year

Table 1 provides summary statistics on the relationships between DIDS structure, industry and year. The results show that firm-year observations are fairly distributed over the period from 2004 to 2013 with fewer observations in 2004 (6.3%) and more

in 2011 (11.3%) and 2013 (11.3%). The most frequently reported industry is industry C (representing 56.3% of the sample population), followed by industry G (14.7% of the sample population) and industry D (10.9% of the sample population). It is also worth noting that industry A, industry D, industry F, industry H, industry K, industry Q and industry S do not record any DIDS observations, implying that a DIDS structure is not popularly used by firms in these industries as a tax management strategy. Although all firms in industry E are associated with DIDS structure, this sample size is relevantly small.

3.2 Dependent variables

ETRs provide a convenient summary of the cumulative effect of various tax incentives and corporate tax rate changes (Gupta and Newberry, 1997). There are various ways to measure a firm's effective tax rate. Stickney and McGee (1982) measure ETRs as a ratio of tax liability to book income. Gupta and Newberry (1997) use the ratio of worldwide tax payable to all tax authorities to total book income before tax. They argue that income taxes paid to different tax authorities often offset each other because of bilateral agreements. This approach is supported by Shevlin and Porter (1992), who point out that focusing only on the U.S. federal tax expense is misleading.

In this study, three different approaches were employed to measure ETRs of sample firms as the dependent variables. Following the work of Gupta and Newberry (1997) and Richardson and Lanis (2007), the first ETRs measurement, ETR1, in Equation 1 is the GAAP (Generally Accepted Accounting Principles) ETR which calculated as the firm's total tax expense divided by pre-tax profit. The tax expense and pre-tax profit figures used are quoted directly from the financial statements. ETR1 is specified as:

$$ETR1 = \frac{total\ tax\ \exp ense}{pre-tax\ profit} \quad (1)$$

The second measurement of ETR2 in Equation 2 is calculated as the cash tax paid divided by the pre-tax profit used by Dyreng et al. (2008) and Markle and Shackelford (2012). This measurement focuses on the actual tax expenses paid by firms. Dyreng et al. (2008) suggest that cash ETRs could overcome some limitations of GAAP ETRs. They argue that the total tax expense applied in GAAP ETR contains both current and deferred tax expenses. However, firms could actually achieve a lower tax expense by increasing deferred tax expense and reduce current tax payable, which cannot be captured by GAAP ETRs (i.e. ETR1). ETR2 is specified as:

$$ETR2 = \frac{actual\ cash\ tax\ paid}{pre-tax\ profit} \quad (2)$$

The third measurement of ETR3 is calculated as the current worldwide tax expense divided by operating cash flow. This alternative measurement is adopted by Gupta and Newberry (1997) who suggest that using operating cash flow can control the systematic differences in accounting method choices used by firms. ETR3 is specified as:

$$ETR3 = \frac{total\ tax\ \exp ense}{operating\ cash\ flow} \quad (3)$$

4.3 Explanatory variables

Several explanatory variables were used because their importance has been established in the literature. These variables include a firm's size (SIZE), which is measured as a logarithm of its market value in U.S. dollars. Firm leverage (LEV) is used to represent capital structure, and measured as long-term debt divided by total assets. Capital intensity (CINT) is measured as net property, plant and equipment divided by total assets. Inventory level (INVINT) is a subset of CINT measured by current assets less cash and cash equivalent divided by total assets. Research and development (RDNT) is used as a proxy measure of the capacity to generate intangible assets, measured by research and development expenditure divided by pre-tax profit. Cash

and equivalent (CASH) is measured by cash and cash equivalent divided by total asset, and is used to assess the liquidity level of the firm. ROA is used to capture the firm's performance and is measured as pre-tax profit divided by total assets. The proportion of foreign income (MULT) is measured by foreign income divided by total income. The main variable is a specific DIDS dummy variable (DIDS) that measures whether a firm has a DIDS strategy to manage its tax. The DIDS dummy variable is equal to 1 if the firm has both a Netherland and Irish subsidiary, and zero if it does not. Industry sector (INSEC) dummy variable is equal to 1 if the firm belongs to that specific category and 0 if it does not[1]. A calendar year dummy variable (YEAR) is also included.

Table 2 describes the variables collected for sample firms. We also introduced several variables to measure the stateless income effect and DIDS strategy discussed in early stages. Dividend yield (DIVDNT) is used to capture firm's dividend policy. As expected, firms involved in DIDS strategies are expected to have less cash on hold in U.S, which may lead to low dividend payouts. As a result, a negative relationship between dividend yield and DIDS is expected. Dividend yield (DIVDNT) is measured by dividend per share divided by price per share.

[1] Industry codes follow NACE where Industry A: Agriculture, forestry and fishing; Industry B: Mining and quarrying; Industry C: Manufacturing; Industry D: Electricity, gas, steam and air conditioning supply; Industry E: Water supply; sewerage, waste management and remediation activities; Industry F: Construction; Industry G: Wholesale and retail trade; repair of motor vehicles and motorcycles; Industry H: Transportation and storage; Industry I: Accommodation and food service activities; Industry J: Information and communication; Industry K: Financial and insurance activities; Industry M: Professional, scientific and technical activities; Industry N: Administrative and support service activities; Industry Q: Human health and social work activities; Industry S: Other service activities

Name	Definition
SIZE	The logarithm of firm market value (in U.S. Dollars)
LEV	Total long-term debt / Total assets
CINT	Net property, plant and equipment / Total assets
INVINT	Current asset less cash and equivalent / Total assets
CASH	Cash and cash equivalent / Total assets
RDNT	Research and development expenditure/ Pre-tax profit
ROA	Pre-tax income / Total assets
DIVDNT	Current dividend / Current share price
MULT	Foreign income / total income
DIDS	DIDS dummy variable equals 1 if the company has both Netherland and Irish subsidiary and otherwise equals 0.
INSEC	Industry sector dummy variable is equal to 1 if the firm belongs to that specific category or 0 otherwise.
YEAR	Year dummy variable equals 1 if the firm financial year belongs to the specific year category or 0 otherwise.

Table 2 List of explanatory variables

3.4 Regression model

This study used a binary regression model to investigate whether firms with specific characteristics are more likely to adopt a DIDS structure (for example whether firms of a larger size or with higher leverage ratios or firms that have higher capacity to generate intangible assets are more likely to adopt a DIDS structure). The model is specified as:

$$DIDS_{it} = \alpha_0 + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CINT_{it} + \beta_4 INVINT_{it} + \beta_5 RDNT_{it} + \beta_6 ROA_{it} + \beta_7 Year_{it} + \varepsilon \quad (4)$$

Both pooled OLS and panel data approaches were used to analyse the data. Following the approach of Gupta and Newberry (1997), Richardson and Lanis (2007), Markel and Shackelford (2012) and Taylor and Richardson (2012), the following model was used

to examine the relationship between ETRs and a firm's characteristics. Additionally, the study investigated whether a DIDS structure has a significant and negative impact on ETRs.

$$ETR_{it} = \alpha_0 + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CINT_{it} + \beta_4 INVINT_{it} + \beta_5 ROA_{it} + \beta_6 RDNT_{it} + \beta_7 CASH_{it} + \beta_8 MULT\ (DIDS)_{it} + \beta_9 YEAR_{it} + \beta_{10} INSEC_{it} + \varepsilon \quad (5)$$

The literature suggests that firms adopting a DIDS structure generate stateless income through the investment and development of intangible properties (Kleinbard 2011). In addition, firms engaging in DIDS are associated with the 'lock-out' effect, which leads to large cash holdings (Foley et al. 2007). Thus, to formally test the impact of RDNT and CASH on ETRs through the DIDS structure, the variables DIDS*RDNT and DIDS*CASH were introduced into the analysis. These represent the DIDS dummy variable multiplied by the independent variables RDNT and CASH, respectively. The interaction terms were introduced to the basic regression model as follows:

$$ETR_{it} = \alpha_0 + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CINT_{it} + \beta_4 INVINT_{it} + \beta_5 ROA_{it} + \beta_6 RDNT_{it} + \beta_7 CASH_{it} + \beta_8 DIDS_{it} + \beta_9 DIDS*RDNT_{it} + \beta_{10} YEAR_{it} + \beta_{11} INSEC_{it} + \varepsilon \quad (6)$$

$$ETR_{it} = \alpha_0 + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 CINT_{it} + \beta_4 INVINT_{it} + \beta_5 ROA_{it} + \beta_6 RDNT_{it} + \beta_7 CASH_{it} + \beta_8 DIDS_{it} + \beta_9 DIDS*CASH_{it} + \beta_{10} YEAR_{it} + \beta_{11} INSEC_{it} + \varepsilon \quad (7)$$

We further employed two models to investigate the relationship between the DIDS structure, dividend decision, capital structure and a firm's characteristics. We used the following empirical models:

$$DIVDNT_{it} = \alpha_0 + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 INVINT_{it} + \beta_4 CINT + \beta_5 ROA_{it} + \beta_6 RDNT_{it} + \beta_7 CASH_{it} + \beta_8 DIDS\ (MULT)_{it} + \beta_9 YEAR_{it} + \beta_{10} INSEC_{it} + \varepsilon \quad (8)$$

$$LEV_{it} = \alpha_0 + \beta_1 SIZE_{it} + \beta_2 SIZE^2_{it} + \beta_3 SIZE^3_{it} + \beta_4 CINT_{it} + \beta_5 INVINT_{it} + \beta_6 RDNT_{it} + \beta_7 CASH_{it} + \beta_8 DIDS_{it} + \beta_9 ROA_{it} + \beta_{10} YEAR_{it} + \beta_{11} INSEC_{it} + \varepsilon \quad (9)$$

Where the dependent variables, ETR_{it}, $DIDS_{it}$, $DIVDNT_{it}$, and LEV_{it} are the ETRs, DIDS,

dividend yield and firm leverage for firm *i* in year *t*, *i* is the firms 1 through 392, *t* is the financial years 2004–2013. As discussed, three different approaches were employed to measure ETRs of the sample firms, therefore, ETR1, ETR2 and ETR3 were used as the dependent variables in models (5), (6) and (7) respectively. The independent variables include proxies for firm size (SIZE), capital structure (LEV), asset mix (INVINT, CASH, RDNT, CINT), firm performance (ROA), foreign expansion (MULT, DIDS), industry sectors (INSEC) and year (YEAR).

A univariate test for the dependent and independent variables of firms with and without a DIDS structure was conducted once the ETRs were measured. The test determined whether firms engaging in a DIDS strategy have statistically lower ETRs than that of their domestic competitors and whether firms adopting a DIDS structure have any specific characteristics. Both the T-test and Wilcoxon rank-sum test tested the difference in mean and median. Hypothesis testing was conducted on each of the explanatory variables to determine if that characteristic has a statistically significant impact on a firms ETRs and the direction and magnitude of this relationship.

4. Empirical results

4.1 Descriptive statistics

Table 2 provides the descriptive statistics for the dependent variables (ETR1, ETR2 and ETR3) and independent variables (SIZE, LEV, CINT, INVINT, RDNT, CASH, ROA, MULT and DIDS). Panel A reports the summary statistics for the full sample, while panels B and C present the summary statistics for the non-DIDS firms and DIDS firms respectively. The results in panel A show that the dependent variables (ETR1, ETR2 and ETR3) have a mean (median) value of 0.283 (0.309), 0.219 (0.232) and 0.237 (0.244) respectively. DIDS has a mean value of 0.389 indicating that 38.9% of firms in the sample adopt DIDS structure. Panels B and C take a closer look into two sub-samples and it is

Table 3 Summary Descriptive Statics of ETRs and Selected Independent Variables

Pannel A: Full size range

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
ETR1	2837	0.283	0.309	0.099	0.000	0.449
ETR2	2681	0.219	0.232	0.116	0.000	0.450
ETR3	2546	0.237	0.244	0.116	0.000	0.450
SIZE	3192	16.047	15.911	1.209	12.040	20.254
LEV	3192	0.587	0.590	0.196	0.056	1.690
CINT	3192	0.285	0.211	0.215	0.001	0.933
INVINT	3192	0.269	0.258	0.144	0.011	0.823
RDNT	3192	0.028	0.007	0.051	0.000	0.757
CASH	3192	0.125	0.076	0.138	0.000	0.874
ROA	3192	0.097	0.093	0.096	-0.963	0.533
MULT	3192	0.324	0.319	0.278	0.000	1.000
DIDS	3192	0.389	0.000	0.488	0.000	1.000
DIVDNT	3192	0.014	0.006	0.020	0.000	0.277

Pannel B: Non-DIDS firms

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
ETR1	1745	0.297	0.326	0.102	0.000	0.449
ETR2	1624	0.219	0.236	0.123	0.000	0.449
ETR3	1513	0.241	0.250	0.120	0.000	0.449
SIZE	1950	15.739	15.695	1.052	12.040	19.303
LEV	1950	0.618	0.624	0.199	0.056	1.690
CINT	1950	0.344	0.285	0.232	0.001	0.933
INVINT	1950	0.261	0.245	0.152	0.011	0.823
RDNT	1950	0.019	0.000	0.052	0.000	0.757
CASH	1950	0.102	0.059	0.128	0.000	0.874
ROA	1950	0.092	0.085	0.095	-0.932	0.533
MULT	1950	0.230	0.111	0.276	0.000	1.000
DIDS	1950	0.000	0.000	0.000	0.000	0.000
DIVDNT	1950	0.016	0.007	0.023	0.000	0.277

Panel C: DIDS firms

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
ETR1	1092	0.262	0.275	0.088	0.000	0.448
ETR2	1057	0.218	0.220	0.105	0.000	0.450
ETR3	1033	0.230	0.237	0.110	0.000	0.450
SIZE	1242	16.532	16.415	1.279	12.614	20.254
LEV	1242	0.540	0.539	0.183	0.109	1.110
CINT	1242	0.192	0.150	0.143	0.010	0.807
INVINT	1242	0.282	0.272	0.129	0.019	0.787
RDNT	1242	0.041	0.025	0.047	0.000	0.452
CASH	1242	0.161	0.112	0.146	0.001	0.809
ROA	1242	0.106	0.104	0.095	-0.963	0.532
MULT	1242	0.472	0.478	0.208	0.000	1.000
DIDS	1242	1.000	1.000	0.000	1.000	1.000
DIVDNT	1242	0.012	0.003	0.015	0.000	0.129

Table 3 Summary Descriptive Statics of ETRs and Selected Independent Variables (CONT)

Panel D: Correlation results

	ETR1	ETR2	ETR3	SIZE	LEV	CINT	INVINT	RDNT	CASH	ROA	MULT	DIDS	DIVDNT
SIZE	-0.0704*	0.0933*	-0.0064	1									
LEV	-0.0075	-0.0750*	-0.0418*	-0.015	1								
CINT	0.069*	-0.1332*	-0.0335	-0.0432*	0.2665*	1							
INVINT	0.1868*	0.2029*	0.0216	-0.1290*	-0.0181	-0.4053*	1						
RDNT	-0.3088*	-0.1240*	-0.0065	0.0695*	-0.2377*	-0.3211*	-0.0578*	1					
CASH	-0.2402*	-0.0663*	0.0069	0.0595*	-0.3581*	-0.3983*	-0.0735*	0.5839*	1				
ROA	0.2606*	0.2360*	0.0727*	0.2183*	-0.2936*	-0.1404*	0.2085*	-0.028	0.1792*	1			
MULT	-0.2963*	0.0302	-0.0245	0.2613*	-0.2342*	-0.3358*	0.0909*	0.3662*	0.2992*	0.1720*	1		
DIDS	-0.1726*	0.0237	-0.003	0.3278*	-0.2056*	-0.3606*	0.0764*	0.2295*	0.2263*	0.0906*	0.4361*	1	
DIVDNT	-0.1021*	-0.0844*	-0.0212	0.1284*	0.2564*	0.2740*	-0.2022*	-0.1481*	-0.1485*	-0.0748*	-0.1124*	-0.1052*	1

* represent significance at 0.05 level, respectively.

observed that the DIDS firms have a lower average mean (median) value of ETRs indicating that firms adopting DIDS structure pay less taxes. The mean, median, standard deviation and range of independent variables are also presented in Table 2, suggesting that specific characteristics vary across firms with and without DIDS structure. The pairwise correlation results of key variables are reported in Panel D of Table 2. They reveal that LEV, RDNT, CASH and DIVDNT are negatively associated with all dependent variables ETR1, ETR2 and ETR3. In addition, ETR1 and ETR2 provide more consistent results in terms of correlation with independent variables as ETR3 is an alternative measurement using operating cash flow to assess the corporate tax burdens, and ETR 1 and 2 pay more attention to pre-tax book income. Furthermore, DIDS is highly correlated with MULT suggesting multi-collinearity. Therefore DIDS and MULT were tested separately in the models used in this study. Finally, a reasonable level of consistency between the means and medians for all variables is evident.

Table 4 reports the univariate test for the dependent and independent variables of firms with and without a DIDS structure. 'Difference Tests' reports both *t* value for T-test and *z* value for Wilcoxon rank-sum test of differences in mean and median. Panel A presents the univariate test for the main independent variables of firms with and without a DIDS structure. It indicates that firms with a DIDS structure have significantly larger sizes, a lower leverage ratio, a lower level of fixed assets, a higher level of inventory, a higher level of intellectual property, more cash in hand, a higher level of profitability, a higher proportion of foreign income and lower dividend yield, which is consistent with the hypotheses developed in this study.

Table 4 Univariate Test for Firm Characteristics and Different Industries

Panel A: *t*-statistcs of significance of independent variales						
	Non-DIDS		DIDS		Difference Tests	
	Mean	Median	Mean	Median	T-value	Z-value
SIZE	15.739	15.695	16.532	16.415	-19.082 ***	-16.840 ***
LEV	0.618	0.624	0.540	0.539	11.132 ***	11.523 ***
CINT	0.344	0.285	0.192	0.150	20.629 ***	18.116 ***
INVINT	0.261	0.245	0.282	0.272	-3.912 ***	-5.401 ***
RDNT	0.019	0.000	0.041	0.025	-12.075 ***	-21.576 ***
CASH	0.102	0.059	0.161	0.112	-11.888 ***	-15.284 ***
ROA	0.092	0.085	0.106	0.104	-3.968 ***	-6.092 ***
MULT	0.230	0.111	0.472	0.478	-26.507 ***	-25.692 ***
DIVDNT	0.016	0.007	0.012	0.003	5.957 ***	3.330 ***
Panel B: *ETI*	Non-DIDS		DIDS		Difference Tests	
	Mean	Median	Mean	Median	T-value	Z-value
ALL	0.297	0.326	0.262	0.275	9.332 ***	13.849 ***
indB	0.311	0.331	0.336	0.323	-0.833	-0.091
indC	0.286	0.306	0.248	0.262	8.679 ***	10.241 ***
indG	0.350	0.368	0.334	0.345	2.409 **	5.485 ***
indI	0.268	0.301	0.300	0.315	-1.253	-0.772
indJ	0.337	0.362	0.256	0.262	4.925 ***	5.826 ***
indM	0.143	0.089	0.258	0.266	-3.425 ***	-2.200 **
indN	0.321	0.366	0.298	0.308	0.375	0.283
Panel C: *ETI*	Non-DIDS		DIDS		Difference Tests	
	Mean	Median	Mean	Median	T-value	Z-value
ALL	0.219	0.236	0.218	0.220	0.141	1.125
indB	0.190	0.185	0.288	0.289	-2.607 ***	-2.652 ***
indC	0.230	0.238	0.218	0.220	2.236 **	2.578 ***
indG	0.301	0.323	0.265	0.291	3.364 ***	3.070 ***
indI	0.194	0.206	0.227	0.216	-1.210	-0.860
indJ	0.225	0.284	0.167	0.157	2.874 ***	2.572 ***
indM	0.074	0.002	0.217	0.220	-3.900 ***	-3.414 ***
indN	0.087	0.079	0.126	0.135	-1.116	-1.225
Panel D: *ETI*	Non-DIDS		DIDS		Difference Tests	
	Mean	Median	Mean	Median	T-value	Z-value
ALL	0.241	0.250	0.230	0.237	2.271 **	2.751 ***
indB	0.211	0.203	0.307	0.335	-2.354 **	-2.278 **
indC	0.257	0.270	0.225	0.231	5.500 ***	5.656 ***
indG	0.305	0.316	0.289	0.318	1.214	0.699
indI	0.209	0.223	0.248	0.252	-1.435	-1.691 *
indJ	0.245	0.276	0.202	0.200	2.213 **	2.621 ***
indM	0.112	0.000	0.249	0.268	-3.219 ***	-2.875 ***
indN	0.133	0.137	0.052	0.055	2.156 **	1.903 *

***, **, * represent statistical significance at the 1%, 5% and 10% levels.

Panel B, C and D present the univariate tests for the dependent variables (ETR1, ETR2 and ETR3) across different industries for firms with and without a DIDS structure. The results show that there is a negative and statistically significant relationship between firms that adopt the DIDS structure and ETRs. As noted in Table 4, only industries B, C, G, I, J, M and N record both DIDS and non-DIDS observations in the sample, thus only these industries are contained in the difference test. ETRs vary significantly across industries mainly due to industrialized taxation policies. In industries C, G, J and N, DIDS firms have significantly lower tax rates than non-DIDS firms for all ETR1, ETR2 and ETR3. In contrast, firms adopting a DIDS structure in industry M have higher ETRs than non-DIDS firms. However, only 55 firm-year observations are available for industry M, representing 1.9% of the total sample data. As a result, there may be a small bias in the sample.

4.2 Regression results

Table 5 reports the regression results for Equation 4. As the dependent variable, DIDS, in this model is a binary variable, we used both Probit and Logit models to investigate whether a firm's characteristics affect the likelihood that they will adopt a DIDS structure (Gujarati, 2004). Table 5 columns 1 and 2 report regression results of the Probit and Logit models for the total sample, respectively. While columns 3 to 8 report the regression results for industries C, G and J separately[2].

The results presented in columns 1 and 2 of Table 5 are consistent with the findings of the univariate tests. For the total sample, SIZE is significantly and positively associated with DIDS, indicating that larger firms are more likely to adopt a DIDS structure and engage in stateless income strategies. LEV and CINT are significantly and negatively associated with DIDS, suggesting that DIDS firms tend to be less leveraged and have a

[2] Among all industries, Industries A, D, E, F, H, K, Q and S contains either DIDS or non-DIDS observations, then Industries B and M have no iteration achieved, Industries I and N do not have sufficient data in independent variables.

lower proportion of fixed assets. The results support the substitution hypothesis proposed by Hanlon and Heitzman (2010). RDNT has a significant and positive relationship with DIDS, implying that firms that have a higher proportion of intellectual property are more likely to adopt DIDS structure. This result corresponds with the view of Kleinbard (2011) that DIDS firms could reduce their tax expenses by developing intellectual property.

Columns 3 to 8 of Table 5 provide further insight into the difference between DIDS and non-DIDS firms in each individual industry. The results for industry C are similar to those for industry G and both are consistent with the total sample size. However, RDNT does not have a significant relationship with DIDS in industry C. In contrast, for industry J, RDNT is not only significantly and positively associated with DIDS but also has a remarkably large coefficient value. Industry J is the Information and Communication industry, which is traditionally called the high technology industry. Firms in industry J tend to be more innovative and control a relatively higher proportion of intellectual properties. Additionally, the significant relationship between RDNT and DIDS in column (1) and (2) is largely driven by firms from industry J. The findings suggest that the relationship between RDNT and DIDS varies across industries. Further, they confirm that the DIDS structure and stateless income is really a return on the development and ownership of intellectual property and is, therefore, only available for certain types of corporations (Davidson, 2011). Moreover, the findings challenge Kleinbard's (2011) notion that a DIDS structure could be easily established and widely adopted by large multinational corporations through expenditure on research and development.

Table 5 Binary Regression Results for the Likelihood of Adopting DIDS Structure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total sample		Industry C		Industry G		Industry J	
	Probit	Logit	Probit	Logit	Probit	Logit	Probit	Logit
	DIDS	DIDS	DIDS	DIDS	DIDS	DIDS	DIDS	DIDS
SIZE	0.416***	0.673***	0.464***	0.757***	0.208	0.329	5.505**	9.602**
	(15.15)	(14.55)	(14.65)	(13.97)	(1.95)	(1.78)	(3.19)	(3.07)
LEV	-0.979***	-1.618***	-1.122***	-1.867***	-1.551**	-2.669**	5.251**	9.382**
	(-5.68)	(-5.59)	(-5.45)	(-5.40)	(-2.59)	(-2.58)	(2.68)	(2.70)
CINT	-2.041***	-3.278***	-0.544*	-0.809	-5.768***	-9.774***	-29.63***	-52.09**
	(-9.63)	(-9.12)	(-2.14)	(-1.93)	(-7.94)	(-7.66)	(-3.30)	(-3.16)
INVINT	0.0722	0.150	0.444	0.749	0.359	0.643	29.67**	52.94**
	(0.31)	(0.39)	(1.39)	(1.44)	(0.65)	(0.69)	(3.18)	(3.10)
RDNT	1.607**	3.153**	0.311	0.515	14.75*	24.19	127.8***	224.5**
	(2.72)	(2.78)	(0.46)	(0.44)	(2.04)	(1.96)	(3.31)	(3.18)
ROA	-1.309***	-2.228***	-1.398**	-2.288**	1.604	2.625	-50.94***	-90.56**
	(-3.60)	(-3.62)	(-3.26)	(-3.16)	(1.44)	(1.41)	(-3.35)	(-3.23)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	No	No	No	No	No	No	No	No
_cons	-5.726***	-9.277***	-6.790***	-11.06***	-2.250	-3.443	-88.76**	-155.0**
	(-12.38)	(-12.00)	(-12.58)	(-12.09)	(-1.38)	(-1.22)	(-3.19)	(-3.07)
N	2170	2170	1598	1598	417	417	155	155

t statistics in parentheses *p<0.05 ** p<0.01 *** p<0.001

Total sample includes Ind C, G, J.
IndA, D, E, F, H, K, Q, S only have DIDS or Non-DIDS firms
IndB, M no iteration achieved
IndI, N no efficient result achieved (no-RDNT either)

Table 6 reports the regression results for the Equation 5 variables of SIZE, LEV, CINT, INVINT, RDNT, CASH, ROA; industry and year effect are included in the equation as the significant relationship between these variables and ETRs has been well documented in the literature (Rego 2003; Richardson and Lanis 2007; Taylor and Richardson 2012). The results are presented in columns (1), (2) and (3) of Table 6. Secondly, DIDS and MULT are added into the model to investigate their impact on ETRs; though, they cannot be included in one regression because of the high correlation between these two variables. The results are presented in columns (4) to (9) of Table 6. The adjusted R^2 of all models is above 27% and relatively stable.

The results show that there is no consistent relationship between a firm's size and its ETRs. As observed, the size of a firm is negatively related to ETR1 and ETR3, but positively related to ETR2, thus hypothesis 4 is not supported. There are two possible explanations for the mixed findings. First, a DIDS structure is mostly adopted by large multinational corporations in the U.S. and the sample data set of this study includes the top 700 listed American firms. Therefore, the explanatory power of the size effect may be diminished in the sample selection. Second, ETR2 is a cash based measurement and the cash tax paid includes a mixture of current tax expense, actual and deferred tax expense which may introduce too much 'noise' into the sample. Thus, using cash tax paid as the ETR measurement may not reflect the real relationship between SIZE and ETRs. In addition, Davidson and Heaney (2012) point out that there exists a non-linear relationship between a firm's size and its ETRs. LEV is negatively related to all ETRs. LEV is significantly associated with ETR1 ($p<0.001$) and ETR3 ($p<0.01$). It supports hypothesis 5 that firms with a higher leverage ratio have more tax-deductible interest expense and, therefore, have lower ETRs, which is consistent with the findings of previous studies (see, for example, Rego 2003; Richardson and Lanis 2007). The results also show that CINT does not have a consistent relationship with ETRs. Therefore, hypothesis 6 that firms with a higher portion of fixed assets would have lower ETRs is not supported. This finding contrasts with previous studies (Gupta and Newberry

1997). The result also suggests that CINT is more closely related to operating cash flow, whereas ETR1 and ETR2 use pre-tax profit as the denominator for the measurement. As expected, INVINT has a significant positive relationship with ETRs. This supports hypothesis 7 that firms with more inventories tend to have higher ETRs. The reason is that holding inventory is not as much of a tax incentive as holding fixed assets.

RDNT has a significant negative association with all ETRs, which strongly supports hypothesis 8 that RDNT is a proxy measurement for the investment and development of intangible assets, indicating that firms with a higher portion of intangible assets tend to have lower ETRs (Hassett and Newmark, 2008; Chen and Gupta, 2009). ROA has a significant positive relationship with all ETRs, supporting hypothesis 9 that firms with higher profits incur a higher corporate tax expense. In short, the empirical results that support hypotheses 7, 8 and 9 are consistent with prior research (Derashid and Zhang 2003; Richardson and Lanis 2007; Chen and Gupta 2009; Taylor and Richardson 2012).

The most notable contribution of these findings is that the key variable of interest, that is, the DIDS dummy variable, has a significant negative relationship with all ETRs. The findings support hypothesis 1 that firms adopting a DIDS structure and engaging in stateless income strategies do enjoy lower ETRs. This result also supports the claims made by Kleinbard (2011). The coefficient value of the variable DIDS in column 4 is -0.022, which represents that firms adopting a DIDS structure and engaging in stateless income strategy have a lower GAAP ETR by 2.2 percent on average. Based on the sample data, the total taxable income for all firms with DIDS structure is $3,305 billion. Thus, these firms have successfully saved US $72.71 billion (72.71= 2.2% * 3305) in tax payments to taxation authorities around the world. MULT has a significant negative relationship

Table 6 Pooled OLS Regression Results of Effective Tax Rates

	(1) ETR1	(2) ETR2	(3) ETR3	(4) ETR1	(5) ETR2	(6) ETR3	(7) ETR1	(8) ETR2	(9) ETR3
SIZE	-0.009***	0.005**	-0.008***	-0.006***	0.006***	-0.005**	-0.005**	0.006**	-0.004*
	(-6.04)	(2.70)	(-4.60)	(-3.79)	(3.51)	(-2.65)	(-3.19)	(3.11)	(-2.47)
LEV	-0.019	-0.017	-0.018	-0.026**	-0.021	-0.026*	-0.0329***	-0.019	-0.030**
	(-1.92)	(-1.46)	(-1.60)	(-2.71)	(-1.81)	(-2.35)	(-3.44)	(-1.68)	(-2.73)
CINT	0.0243*	-0.009	-0.064***	0.013	-0.016	-0.073***	0.017	-0.011	-0.068***
	(2.03)	(-0.65)	(-4.65)	(1.07)	(-1.07)	(-5.31)	(1.47)	(-0.75)	(-5.01)
INVINT	0.014	0.037*	0.051**	0.021	0.041*	0.061**	0.043**	0.043*	0.076***
	(0.87)	(1.97)	(2.64)	(1.34)	(2.19)	(3.15)	(2.75)	(2.27)	(3.94)
ROA	0.312***	0.324***	0.725***	0.301***	0.316***	0.710***	0.315***	0.325***	0.730***
	(15.10)	(11.67)	(27.09)	(14.61)	(11.36)	(26.50)	(15.58)	(11.70)	(27.68)
RDNT	-0.294***	-0.432***	-0.320***	-0.294***	-0.432***	-0.326***	-0.221***	-0.415***	-0.268***
	(-6.58)	(-7.78)	(-6.12)	(-6.62)	(-7.78)	(-6.26)	(-4.98)	(-7.37)	(-5.17)
CASH	-0.147***	-0.130***	-0.159***	-0.143***	-0.127***	-0.152***	-0.134***	-0.128***	-0.143***
	(-8.94)	(-6.68)	(-8.33)	(-8.72)	(-6.52)	(-7.97)	(-8.30)	(-6.54)	(-7.57)
DIDS				-0.022***	-0.013**	-0.022***			
				(-5.83)	(-2.78)	(-4.93)			
MULT							-0.081***	-0.018*	-0.075***
							(-10.99)	(-1.99)	(-8.89)
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dumm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
_cons	0.481***	0.199***	0.407***	0.441***	0.174***	0.366***	0.412***	0.184***	0.348***
	(12.99)	(4.41)	(9.93)	(11.76)	(3.80)	(8.79)	(11.20)	(4.03)	(8.51)
N	2837	2681	2546	2837	2681	2546	2837	2681	2546
Adj R2	0.280	0.290	0.390	0.288	0.292	0.396	0.309	0.291	0.409

t statistics in parentheses *p<0.05 ** p<0.01 *** p<0.001

with all ETRs. The findings support hypothesis 2 that firms with a higher proportion of foreign income have lower ETRs, suggesting that these firms do have more opportunities to engage in tax avoidance activities. The findings are consistent with previous research (Rego, 2003; Dyreng et al., 2008; Richardson and Lanis, 2007). CASH has a significant and negative relationship with ETR1 ($p<0.001$), ETR2 ($p<0.001$) and ETR3 ($p<0.001$). This strongly supports hypothesis 3 that firms holding more cash and cash equivalent have lower ETRs, indicating that the 'lock-out' effect may be a main concern for firms applying stateless income strategies through their globalization platform.

The results of panel data approaches are presented in Table 7. According to the Hausman Test, a random effect model is the preferred model and the results are fairly consistent with the pooled OLS analysis (see Table 6). SIZE has an insignificant relationship with ETR1 and ETR3 and a significant positive relationship with ETR2. Hence hypothesis 4 is not supported. LEV has a significant negative relationship with ETRs and supports hypothesis 5 that firms with lower leverage ratios have lower ETRs. CINT has an insignificant relationship with ETRs. Therefore, hypothesis 6 is not supported and on this basis it cannot be concluded that firms with a higher portion of fixed assets have lower ETRs.

INVINT is positively associated with all ETRs, which is consistent with the findings in Table 6; however, the effect of INVINT is statistically insignificant, which may be attributed to differences between the methods of pooled OLS and panel data analysis (Gujarati 2004). Hence, hypothesis 7 is not supported and firms with higher inventory levels do not have higher ETRs. ROA has a significant positive relationship with ETRs, which supports hypothesis 9 that firms with higher profitability have higher ETRs. RDNT, CASH, DIDS and MULT have a significant negative relationship with ETRs, which is consistent with the findings of pooled OLS analysis presented in Table 6 and supports hypotheses 1, 2, 3 and 8.

Table 7 Panel Data Regression Results of Effective Tax Rates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ETR1	ETR2	ETR3	ETR1	ETR2	ETR3	ETR1	ETR2	ETR3
SIZE	-0.00207	0.00945***	-0.00178	-0.000264	0.0108***	0.000629	-0.000381	0.00959***	0.000962
	(-0.86)	(3.36)	(-0.67)	(-0.11)	(3.70)	(0.23)	(-0.16)	(3.35)	(0.37)
LEV	-0.0324*	-0.0116	-0.0250	-0.0356**	-0.0144	-0.0306*	-0.0380**	-0.0120	-0.0344*
	(-2.49)	(-0.74)	(-1.61)	(-2.75)	(-0.91)	(-1.97)	(-2.94)	(-0.76)	(-2.24)
CINT	0.0205	-0.0213	-0.0730***	0.0107	-0.0276	-0.0841***	0.0140	-0.0217	-0.0814***
	(1.03)	(-0.91)	(-3.39)	(0.53)	(-1.16)	(-3.90)	(0.71)	(-0.93)	(-3.86)
INVINT	0.0208	0.0527	0.0623*	0.0238	0.0555	0.0683*	0.0342	0.0535	0.0828**
	(0.88)	(1.86)	(2.23)	(1.02)	(1.96)	(2.46)	(1.46)	(1.88)	(3.00)
ROA	0.253***	0.112***	0.685***	0.248***	0.107**	0.677***	0.252***	0.112***	0.687***
	(12.18)	(3.35)	(22.65)	(11.96)	(3.19)	(22.36)	(12.20)	(3.36)	(22.95)
RDNT	-0.174**	-0.362***	-0.322***	-0.167**	-0.357***	-0.315***	-0.150**	-0.360***	-0.279***
	(-2.98)	(-4.95)	(-4.56)	(-2.87)	(-4.88)	(-4.49)	(-2.59)	(-4.88)	(-3.99)
CASH	-0.101***	-0.107***	-0.0969***	-0.100***	-0.106***	-0.0955***	-0.0995***	-0.106***	-0.0904***
	(-5.19)	(-4.41)	(-4.08)	(-5.18)	(-4.38)	(-4.04)	(-5.16)	(-4.40)	(-3.85)
DIDS				-0.0296***	-0.0146	-0.0291***			
				(-3.54)	(-1.72)	(-3.56)			
MULT							-0.0573***	-0.00364	-0.0814***
							(-4.81)	(-0.26)	(-6.16)
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dumm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
_cons	0.390***	0.143	0.325***	0.366***	0.124	0.292***	0.361***	0.140	0.278***
	(4.85)	(1.74)	(4.14)	(4.58)	(1.50)	(3.74)	(4.60)	(1.70)	(3.63)
N	2837	2681	2546	2837	2681	2546	2837	2681	2546

t statistics in parentheses * p<0.05 ** p<0.01 *** p<0.001

Table 8 presents the regression results for Equations 6 and 7 using the Pooled OLS model. The results of independent variables (SIZE, LEV, CINT and etc.) are consistent with the findings reported in Tables 6 and 7, supporting hypothesis 2 to 9. In addition, the coefficients of DIDS*RDNT are negatively and significantly related to ETR1 ($p<0.05$) and ETR3 ($p<0.001$) with only one exception in column 5. These findings show that firms with higher RDNT can more effectively reduce their ETRs via a DIDS structure. The results further confirm the argument that multinational firms exploit their intangible property to generate stateless income (Kleinbard 2011). DIDS*CASH also generates a significant negative relationship with all ETRs. The results show that firms with a DIDS structure can more effectively reduce their ETRs but they have to retain large amount of cash outside of the US territory, which can be explained by the 'lock-out' effect.

The empirical results of panel data approaches for Equations 6 and 7 are presented in Table 9. In general, DIDS, DIDS*RDNT and DIDS*CASH are negatively associated with all ETRs, which is consistent with the findings reported in Table 8. However, the overall explanatory power of these variables decreases dramatically. One possible explanation could be linked to the definition of the DIDS variable. Available data indicated whether the sample firm has an Irish or Netherland subsidiary but was limited as to when the subsidiary was established. Thus, the DIDS value of the sample firms is relatively stable during our sample period.

Table 8 Pooled OLS Regression Results of Effective Tax Rates for Equation 6&7

	(1) ETR1	(2) ETR2	(3) ETR3	(4) ETR1	(5) ETR2	(6) ETR3	(7) ETR1	(8) ETR2	(9) ETR3
SIZE	-0.00582***	0.00647***	-0.00462**	-0.00564***	0.00649***	-0.00429*	-0.00563***	0.00694***	-0.00431*
	(-3.79)	(3.51)	(-2.65)	(-3.68)	(3.52)	(-2.46)	(-3.66)	(3.76)	(-2.47)
LEV	-0.0263**	-0.0209	-0.0264*	-0.0277**	-0.0210	-0.0307**	-0.0281**	-0.0249*	-0.0298**
	(-2.71)	(-1.81)	(-2.35)	(-2.86)	(-1.82)	(-2.73)	(-2.89)	(-2.15)	(-2.65)
CINT	0.0129	-0.0158	-0.0733***	0.0161	-0.0153	-0.0668***	0.0146	-0.0118	-0.0703***
	(1.07)	(-1.07)	(-5.31)	(1.33)	(-1.03)	(-4.81)	(1.20)	(-0.80)	(-5.09)
INVINT	0.0210	0.0414*	0.0612**	0.0203	0.0413*	0.0605**	0.0213	0.0422*	0.0619**
	(1.34)	(2.19)	(3.15)	(1.30)	(2.19)	(3.12)	(1.36)	(2.24)	(3.19)
ROA	0.301***	0.316***	0.710***	0.305***	0.317***	0.717***	0.301***	0.314***	0.712***
	(14.61)	(11.36)	(26.50)	(14.76)	(11.33)	(26.74)	(14.61)	(11.29)	(26.60)
RDNT	-0.294***	-0.432***	-0.326***	-0.238***	-0.423***	-0.222***	-0.300***	-0.446***	-0.343***
	(-6.62)	(-7.78)	(-6.26)	(-4.70)	(-6.36)	(-3.72)	(-6.74)	(-8.03)	(-6.56)
CASH	-0.143***	-0.127***	-0.152***	-0.140***	-0.127***	-0.147***	-0.116***	-0.0700**	-0.102***
	(-8.72)	(-6.52)	(-7.97)	(-8.48)	(-6.50)	(-7.70)	(-5.50)	(-2.72)	(-4.00)
DIDS	-0.0224***	-0.0128**	-0.0219***	-0.0168***	-0.0121*	-0.0114*	-0.0154**	0.00164	-0.00979
	(-5.83)	(-2.78)	(-4.93)	(-3.69)	(-2.20)	(-2.13)	(-2.97)	(0.26)	(-1.61)
DIDS*RDNT				-0.170*	-0.0218	-0.299***			
				(-2.30)	(-0.24)	(-3.54)			
DIDS*CASH							-0.0497*	-0.102***	-0.0858**
							(-1.97)	(-3.42)	(-2.94)
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dumm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
_cons	0.441***	0.174***	0.366***	0.437***	0.174***	0.361***	0.436***	0.163***	0.358***
	(11.76)	(3.80)	(8.79)	(11.67)	(3.78)	(8.68)	(11.62)	(3.56)	(8.59)
N	2837	2681	2546	2837	2681	2546	2837	2681	2546
Adj.R2	0.288	0.292	0.396	0.289	0.292	0.399	0.289	0.295	0.398

t statistics in parentheses *p<0.05 ** p<0.01 *** p<0.001

Table 9 Panel Data Regression Results of Effective Tax Rates for Equation 6&7

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	ETR1	ETR2	ETR3	ETR1	ETR2	ETR3	ETR1	ETR2	ETR3
SIZE	-0.000264	0.0108***	0.000629	-0.000334	0.0108***	0.000669	-0.000265	0.0109***	0.000641
	(-0.11)	(3.70)	(0.23)	(-0.14)	(3.69)	(0.25)	(-0.11)	(3.73)	(0.24)
LEV	-0.0356**	-0.0144	-0.0306*	-0.0362**	-0.0140	-0.0330*	-0.0358**	-0.0164	-0.0315*
	(-2.75)	(-0.91)	(-1.97)	(-2.80)	(-0.89)	(-2.13)	(-2.76)	(-1.03)	(-2.03)
CINT	0.0107	-0.0276	-0.0841***	0.0191	-0.0296	-0.0784***	0.0115	-0.0243	-0.0816***
	(0.53)	(-1.16)	(-3.90)	(0.95)	(-1.24)	(-3.62)	(0.57)	(-1.02)	(-3.77)
INVINT	0.0238	0.0555	0.0683*	0.0272	0.0553	0.0700*	0.0245	0.0570*	0.0696*
	(1.02)	(1.96)	(2.46)	(1.16)	(1.95)	(2.53)	(1.05)	(2.01)	(2.51)
ROA	0.248***	0.107**	0.677***	0.253***	0.105**	0.680***	0.248***	0.107**	0.677***
	(11.96)	(3.19)	(22.36)	(12.19)	(3.12)	(22.47)	(11.96)	(3.21)	(22.38)
RDNT	-0.167**	-0.357***	-0.315***	-0.0339	-0.399***	-0.220**	-0.167**	-0.369***	-0.323***
	(-2.87)	(-4.88)	(-4.49)	(-0.50)	(-4.24)	(-2.65)	(-2.88)	(-5.03)	(-4.59)
CASH	-0.100***	-0.106***	-0.0955***	-0.0932***	-0.106***	-0.0926***	-0.0919***	-0.0698*	-0.0665*
	(-5.18)	(-4.38)	(-4.04)	(-4.81)	(-4.37)	(-3.92)	(-3.51)	(-2.14)	(-2.03)
DIDS	-0.0296***	-0.0146	-0.0291***	-0.0130	-0.0180	-0.0190*	-0.0271**	-0.00432	-0.0213*
	(-3.54)	(-1.72)	(-3.56)	(-1.38)	(-1.84)	(-2.01)	(-2.76)	(-0.41)	(-2.10)
DIDS*RDNT				-0.455***	0.0951	-0.282*			
				(-3.83)	(0.70)	(-2.14)			
DIDS*CASH							-0.0162	-0.0683	-0.0520
							(-0.48)	(-1.64)	(-1.29)
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dumm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
_cons	0.366***	0.124	0.292***	0.363***	0.126	0.290***	0.365***	0.120	0.289***
	(4.58)	(1.50)	(3.74)	(4.54)	(1.52)	(3.73)	(4.56)	(1.46)	(3.71)
N	2837	2681	2546	2837	2681	2546	2837	2681	2546

t statistics in parentheses *p<0.05 ** p<0.01 *** p<0.001

We were particularly interested in the impact of the DIDS structure and 'lock-out' effect. Thus, Equation 8 was developed to examine the relationship between a DIDS structure and a firms' dividend payout. Table 10 reports the regression results for Equation 8. The results of the Pooled OLS approach are presented in columns (1), (2) and (3), while the results of the panel data approach are presented in columns (4), (5) and (6).

Firms adopting a DIDS structure could generate stateless income, which would result in large amounts of cash on hand outside the U.S. territory. Therefore, these firms tend to have lower dividend payouts. However, the results presented in Table 10 do not indicate any statistically significant relationship between DIDS and DIVDNT. We could not confidently conclude that firms adopting a DIDS structure are paying lower dividends. Thus, hypothesis ten (H10) cannot be supported. One explanation would be that the DIDS as the dummy variable is relatively stable, which weakens its explanatory power. Therefore, we replaced the DIDS variable with MULT, the proportion of foreign income as the proxy of DIDS. Columns (3) and (6) show that MULT is negatively and significantly related to DVIDNT, which indicates that firms with a higher proportion of foreign income would have a lower dividend payout. A second explanation could be that historically low interest rates in the U.S. in recent years are having an impact on firms' decision making. The low interest rate encourages firms to borrow from the U.S. market to pay dividends. The relationship between the location of the loan and a firms' dividend payout requires further investigation.

Table 10 Pooled OLS and Pannel Data Analysis Results for DIVDNT

	(1) OLS DIVDNT	(2) OLS DIVDNT	(3) OLS DIVDNT	(4) Panel DIVDNT	(5) Panel DIVDNT	(6) Panel DIVDNT
SIZE	0.00220***	0.00219***	0.00245***	0.000568	0.000559	0.000895
	(7.20)	(7.15)	(8.26)	(1.18)	(1.16)	(1.90)
LEV	0.0171***	0.0172***	0.0162***	0.0145***	0.0146***	0.0137***
	(8.87)	(8.90)	(8.42)	(5.51)	(5.54)	(5.19)
INVINT	-0.00666*	-0.00662*	-0.00473	-0.00522	-0.00535	-0.00353
	(-2.14)	(-2.12)	(-1.50)	(-1.12)	(-1.14)	(-0.75)
CINT	0.00585*	0.00565*	0.00546*	0.00742	0.00688	0.00629
	(2.43)	(2.33)	(2.30)	(1.93)	(1.77)	(1.65)
ROA	0.00771	0.00746	0.00802*	0.00179	0.00139	0.00144
	(1.88)	(1.81)	(1.97)	(0.39)	(0.30)	(0.32)
RDNT	-0.0251**	-0.0286**	-0.0200*	-0.0188	-0.0270*	-0.0152
	(-2.83)	(-2.83)	(-2.25)	(-1.61)	(-1.99)	(-1.29)
CASH	0.00112	0.000905	0.00197	0.00297	0.00251	0.00351
	(0.34)	(0.28)	(0.61)	(0.73)	(0.61)	(0.86)
DIDS	-0.000183	-0.000537		0.00121	0.000222	
	(-0.24)	(-0.59)		(0.85)	(0.14)	
DIDSRDNT		0.0107			0.0276	
		(0.73)			(1.21)	
MULT			-0.00554***			-0.00549*
			(-3.73)			(-2.37)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
_cons	-0.0439***	-0.0437***	-0.0482***	-0.0193	-0.0189	-0.0243
	(-5.88)	(-5.85)	(-6.50)	(-1.39)	(-1.37)	(-1.77)
N	2837	2837	2837	2837	2837	2837
adj. R-sq	0.345	0.345	0.348			

t statistics in parentheses *p<0.05 ** p<0.01 *** p<0.001

Table 11 reports the regression results for Equation 9 to further investigate the impact of a DIDS structure and stateless income on the capital structure of a firms. The results of the Pooled OLS model are presented in columns (1). They indicate that the adjusted R^2 of the mode is 28.4%. The results of panel data approach are presented in columns (2). Following the approach of Davidson and Heaney (2012), we introduced a cubic relationship of firm SIZE and LEV. The results of Table 11 show that DIDS is negatively and significantly related to LEV for both pooled OLS and panel data approaches. The findings indicate that firms adopting a DIDS structure and generating stateless income are associated with a lower leverage ratio, which is consistent with the expectations on the relationship between DIDS structure and a firm's capital structure. These findings also support the claim of Foley et al. (2007) that U.S. multinational corporations are more likely to retain cash in their foreign affiliates to avoid the implied tax consequence with repatriation. Thus, the larger amount of cash holdings leads to a lower leverage ratio.

Table 11 Pooled OLS and Pannel Data Analysis Results for LEV

	(1) OLS LEV	(2) Panel LEV
SIZE	-1.899**	-0.812
	(-2.96)	(-1.93)
SIZE^2	0.115**	0.0466
	(2.92)	(1.77)
SIZE^3	-0.00228**	-0.000919
	(-2.84)	(-1.69)
CINT	0.110***	-0.0132
	(4.71)	(-0.41)
INVINT	0.320***	0.209***
	(10.66)	(6.13)
RDNT	-0.416***	0.232**
	(-4.84)	(2.66)
CASH	-0.202***	-0.162***
	(-6.37)	(-6.09)
DIDS	-0.0547***	-0.0423*
	(-7.39)	(-2.12)
ROA	-0.573***	-0.274***
	(-14.81)	(-10.33)
YEAR	Yes	Yes
Induestry	Yes	Yes
N	2837	2837
adj. R-sq	0.284	

t statistics in parentheses *p<0.05 ** p<0.01 *** p<0.001

Conclusion

Stateless income has attracted the attention of the media in recent years. However, the literature on stateless income and its determinants is relatively thin. This research has empirically explored the relationship between stateless income strategies and a firm's characteristics. It has also examined whether firms adopting stateless income strategies have lower ETRs, and investigated the impact of stateless income strategies on a firm's dividend payout and capital structure policies.

Using a sample of 2837 firm-year observations selected from top U.S. listed companies from 2004 to 2013, we found that larger firms with intangible assets are more likely to adopt DIDS structure. Thus, we argue that development and investment in intangible and intellectual property is an important component in developing a DIDS structure and generating stateless income. However, stateless income is not a universal tool for all companies across different industries, which is inconsistent with claims that stateless income can be widely implemented by all large multinational corporations (Kleinbard, 2011). The empirical results also show that firms adopting a DIDS structure tend to have lower ETRs, large cash holdings outside the U.S., and a lower leverage ratio compared to firms not engaging in a DIDS structure, which is consistent with the literature (Dyreng and Lindsey 2009; Faulkender and Petersen 2012; Taylor and Richardson 2012). Additionally, the results suggest that firms generating stateless income experience the 'lock-out' effect in relation to repatriation.

We acknowledge that our study has several limitations. First, a majority of firms do not disclose the proportion of income earnt by Dutch and Netherland subsidiaries. Thus, while we could still adopt the DIDS dummy as the proxy, it would be difficult to measure the extent of its impact for stateless income. Second, while we could obtain data on whether the firm has Irish or Netherland subsidiaries, we could not detect at what time the firm first established its DIDS structure.

On October 14, 2014, the Irish government announced plans to stop its double resident tax policy, which would lead to the end of the DIDS and effect stateless income tax strategies. From January 1 2015, new companies may not pursue the 'Double Irish' scheme and it can only operate until 2021 for existing companies. Further research could focus on how the end of the DIDS will affect the ETRs of multinational corporations' and the emergence of alternative tax planning strategies. The U.K. and the Netherlands have announced the so called 'knowledge development box', which allows companies to separate out income stemming from intellectual property to which a much lower tax rate is applied. In addition, the Irish Finance Minister Michael Noonan mentioned that a comparable Irish regime "will be best in class and at a low competitive and sustainable tax rate". Future research could consider the effect of intellectual property relocation and global tax competition.

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